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MASONRY COMMUNICATIONS TOWERS IN EAST GERMANY:
PLANS, PATTERNS, AND PURPOSES
1957-60

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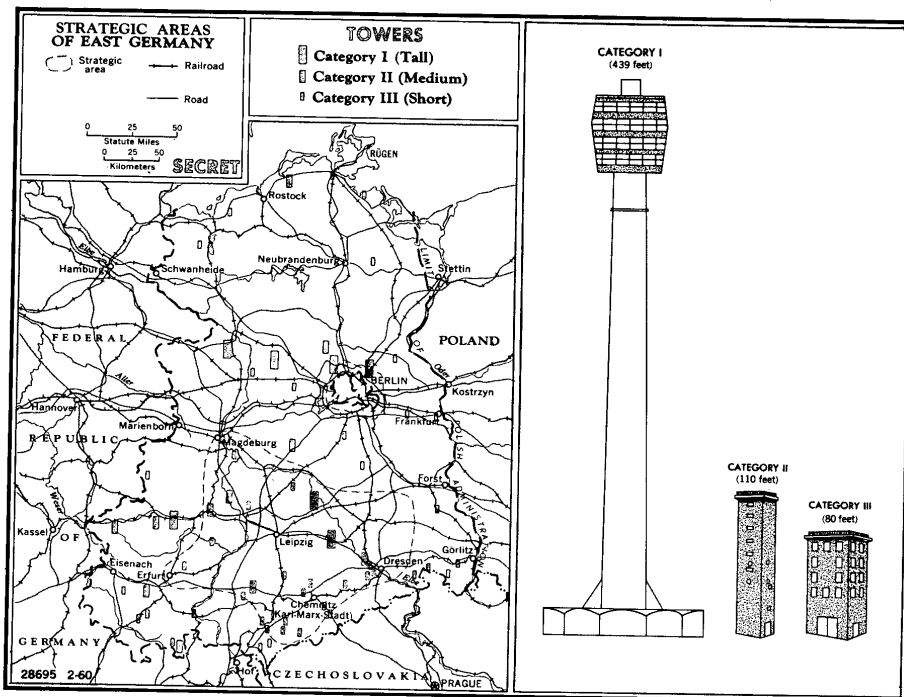
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MASONRY COMMUNICATIONS TOWERS IN EAST GERMANY:
PLANS, PATTERNS, AND PURPOSES*
1957-60

Summary and Conclusions

Since 1957, masonry towers for housing electronics equipment have been under construction at 63 locations in East Germany. By size and shape these towers fall into three basic categories. The map and the sketch below show the geographic locations and the external structural features of each category. Of the 63 towers, which represent only a portion of the total number to be constructed, 7 are Category I (tall), 11 are Category II (medium), and 45 are Category III (short).



These towers will contain equipment with which to expand conventional telephone, telegraph, and broadcast services. In addition, at least some of the towers probably will accommodate other electronic equipment for purposes that are not yet clearly revealed. The total cost of constructing these towers, unequipped, is estimated to be

* The estimates and conclusions in this report represent the best judgment of this Office as of 1 February 1960.

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27 million DME.* The total cost of known conventional equipment is estimated to be about 58 million DME.

As users of these towers, four parts of government are directly concerned with the program: the Ministry of Post and Telecommunications (MPT), the Central Committee of the Socialist Unity (Communist) Party (SED), the Ministry of Defense (MINAVE), and the State Radio Committee. Some of the towers serve more than one user and for more than one purpose, showing that the over-all tower program has been integrated at high government levels.

The towers will be organized into two groups to enlarge two existing microwave radio relay networks, one of the MPT and the other of the SED. The tall towers will be used in the enlarged MPT network. Employing domestic equipment with a capacity of 600 telephone channels or 1 television channel, this network will extend both east and west and north and south. It will include three connected "round robin" rings -- the northern, middle, and southern -- designed to improve operational reliability of the public telephone, telegraph, and local and network television services of the MPT. The television service of the State Radio Committee will be greatly improved in quality and coverage, both in East Germany and in West Germany, by the antennas to be placed on these towers.

All of the medium towers and most of the short towers will be used in the enlarged SED network. Employing equipment with a capacity of 8 telephone channels (selected from 20 alternative channels), this network when completed in 1962 will extend the coverage, improve the reliability, and strengthen the physical security of Party communications service.

Some of the towers appear to be intended for specialized purposes as well. Speculatively, the tall towers could provide radar, missile guidance, telemeter, meteorological, electronic countermeasure (ECM), or jamming services. Some of the short towers may close the southern ring of the microwave radio relay network of the MPT. Others near the West German border probably will be used to jam radio broadcasts from West Germany. All medium and short towers serving the SED are likely to be used also by MINAVE in a special air defense network, as part of a long-range program to integrate microwave radio relay facilities with a "hardened" underground coaxial cable line that is already started but far behind schedule. This over-all system, with probable connections to the USSR and other Bloc countries, if completed, would greatly improve the reliability of communications in the Soviet Bloc.

The construction of tall towers in East Germany is believed to be related to a program of the Organization for Cooperation Among the Socialist Countries in the Fields of Post and Communications (OSS). The OSS is mainly concerned with standardizing, integrating, and expanding the telecommunications networks of the countries of the Soviet Bloc. To the extent that the program in East Germany is related to

* Deutsche Mark East (East German marks). Unless otherwise indicated, DME values in this report are expressed in terms of current DME's and for construction costs may be converted to US dollars at the rate of exchange of 4 DME to US \$1. For communication equipment costs, DME may be converted to US dollars at the rate of exchange of 9 DME to US \$1. These rates, however, do not necessarily reflect the true dollar value of particular projects or pieces of equipment.

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OSS objectives, it may foreshadow similar developments in the other countries of the Bloc.

The tower program in East Germany also appears to be part of a broader effort, probably influenced -- if not encouraged -- by the USSR, to achieve greater control of the unstable East German population, to communize both the East German and the West German people, to support the growth of the economy, and to improve communications for the police and military forces. In this effort the East-West contentions over the status of Berlin and East Germany may have been a factor.

I. Physical Characteristics

Since 1957, masonry towers have been under construction at 63 sites in East Germany. On the basis of their shape and size, these towers can be grouped into three basic categories.

A. Category I (Tall)

Category I towers have been observed under construction at 7 locations in East Germany.* Plans indicate that similar structures will be constructed at four other locations. The tall towers are circular structures built according to two basic designs. Three of the towers are tapered structures reaching a masonry height of about 439 feet. The remaining four are straight structures of constant diameter, ranging in height from about 197 feet to about 328 feet. Of the four tall towers planned for construction, the two at Glienick and Petkus will be straight structures, whereas the two at Dresden and Schwerin will be tapered.

The photograph, Figure 1,** and the sketch, Figure 2,** show the important features of the three tapered tall towers that have been identified to date. Built of reinforced concrete poured in place, these towers have foundation slabs about 100 feet diameter. This width is considered to be sufficient to support the dead weight of the tower and to resist wind loading.

There are minor differences between the tapered tower at Dequede and the towers at Bernau/Birkholz and Perwenitz. As shown in the photographs, Figure 3** and Figure 4,** and the sketch, Figure 5,** the base structure of the Dequede tower is two stories high with a concrete roof sloping in towards the tower. The base structures of the towers at Bernau/Birkholz and Perwenitz, however, are only one story high and have a curved, thin-shell concrete roof. The towers at Bernau/Birkholz and Perwenitz are completely encompassed by the base structure, but the tower at Dequede is not. Nevertheless, both types of base structures probably contain the same amount of enclosed floorspace, about 10,000 square feet.

* See the map, Figure 10, following p. 6.

** Following p. 4.

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The photograph, Figure 6,* shows the straight tall tower during construction at Rhinow. All straight tall towers under construction or planned are similar to this one.

B. Category II (Medium)

Category II towers have been observed in various stages of construction at 11 locations in East Germany** and appear to have been built from standard plans. The medium towers are relatively slender, flat-roofed structures about 14 feet square and about 110 feet high. The photograph, Figure 7,* and the sketch, Figure 8,* show the important features of these towers. The overhanging roof is surrounded by an iron railing, and anchorage points located at the four corners indicate that the roof will serve as a mounting platform for an antenna. All medium towers are surrounded by a fence, which may house some type of warning device against intruders. Power will be brought into the tower from a transformer station located at the fence.

C. Category III (Short)

Category III towers have been observed in various stages of construction at 45 sites in East Germany.** These towers are located primarily along the mountainous southern border of the country and, except for two of 100 feet, range in height from about 50 feet to about 80 feet. This wide range in the heights of the short towers probably is related to elevation and terrain conditions at or near the site as well as to the purposes for which the tower is being built.

The size, shape, and window arrangement of the short towers vary, but the basic design is quite uniform and suggests that a basic standard design was used and that it was then altered only slightly to fit conditions of construction and use. The sketch, Figure 9,* shows the general features of the typical short tower.

An iron fence surrounds the entire roof of the short tower. Steel tie-down plates, embedded in concrete, are located in the four corners of the roof. Reports indicate that a steel mast about 98 feet high and weighing about 12 tons will be mounted on the roofs of all these towers. Such masts, mounting parabolic antennas, have been observed on at least two of the towers.

II. Purposes of the Towers

These masonry towers in East Germany are essentially functional structures. It is clear that one of the purposes of these towers is to house and support equipment for use in expanding telephone, telegraph, and broadcasting services, but they also could accommodate electronic equipment for specialized purposes. For conventional services, all of the towers will house equipment for new or expanded microwave radio relay networks, and some of the towers also will support antennas for radiobroadcasting and telecasting.

At present, there are two major microwave radio relay networks in East Germany. One is operated and controlled by the Ministry of Post and Telecommunications (MPT) and the other by the Central Committee of the Socialist Unity (Communist) Party (SED). The MPT network is

* Following p. 4.

** See the map, Figure 11, following p. 10.

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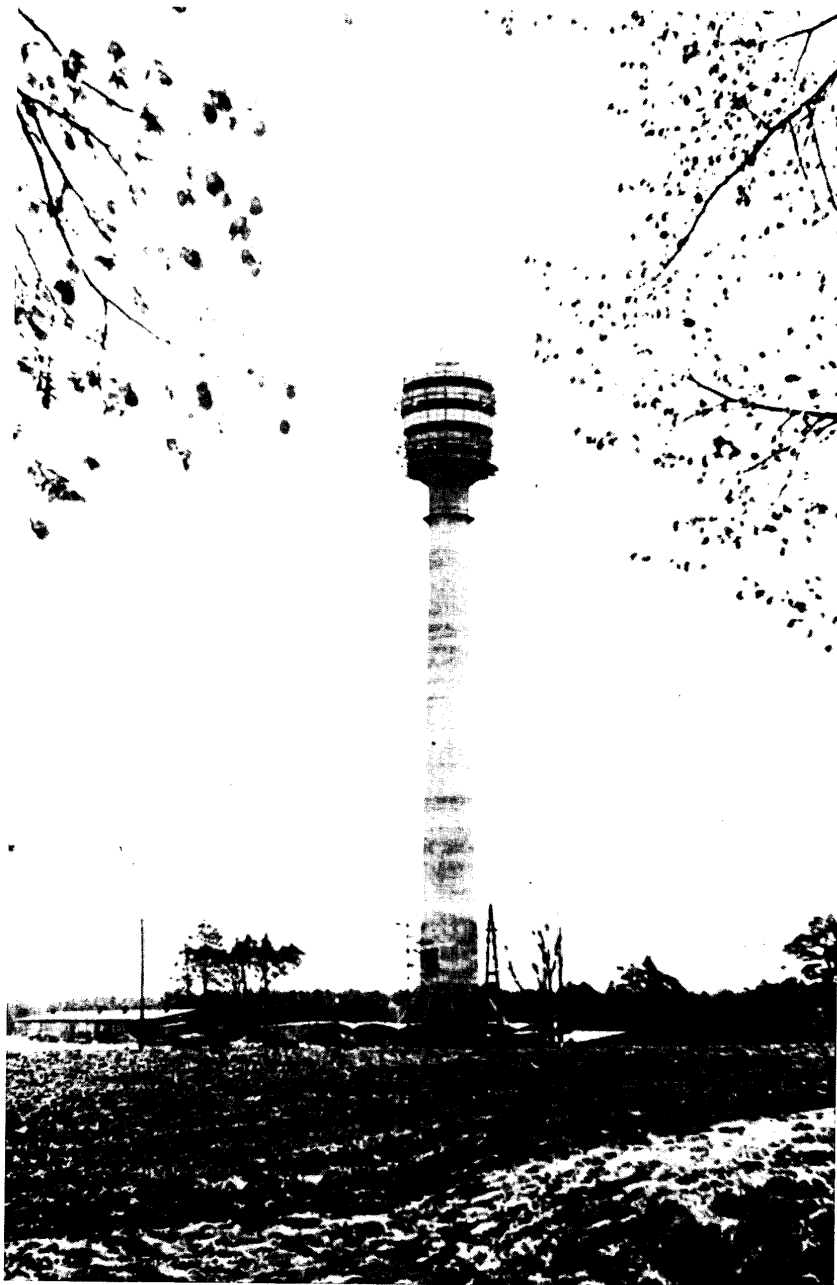


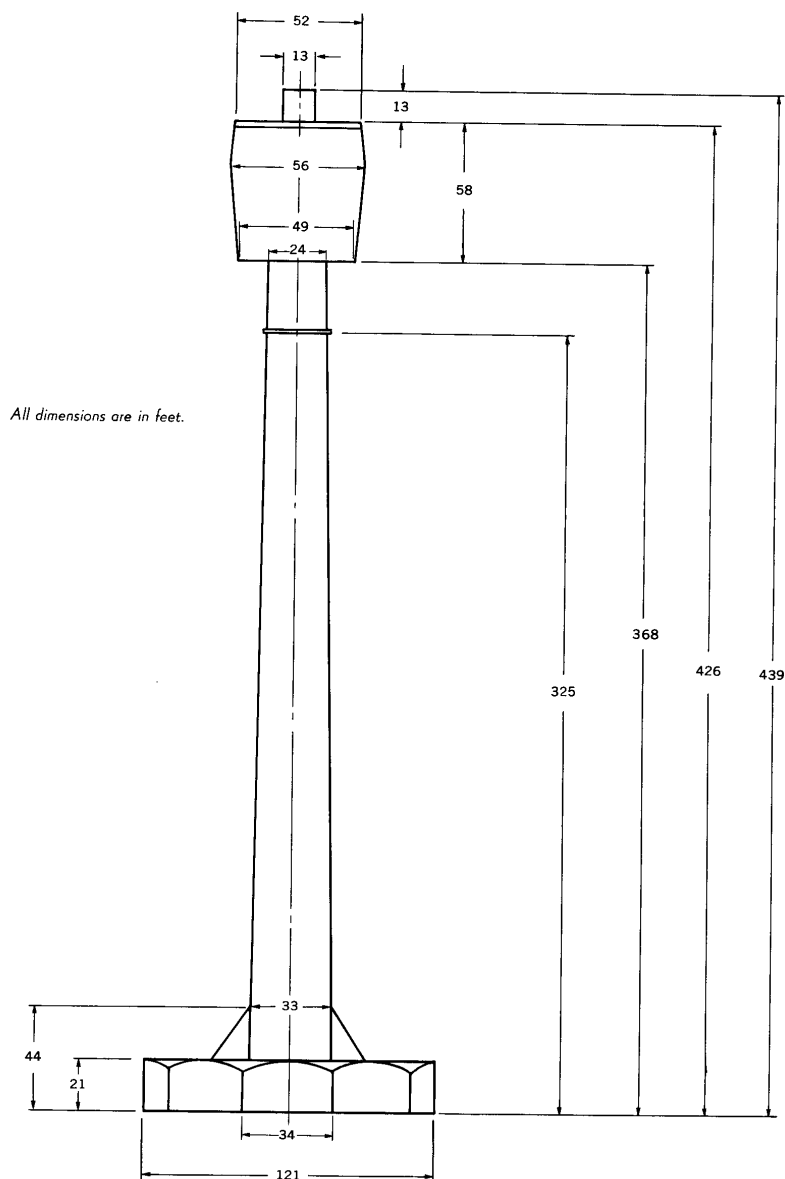
FIGURE 1

East Germany: Tapered Category I (Tall) Tower Under Construction
at Perwenitz, 1959

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Figure 2



EAST GERMANY: Sketch of Tapered Category I (Tall) Tower Under Construction
at Bernau/Birkholz and Perwenitz, 1959

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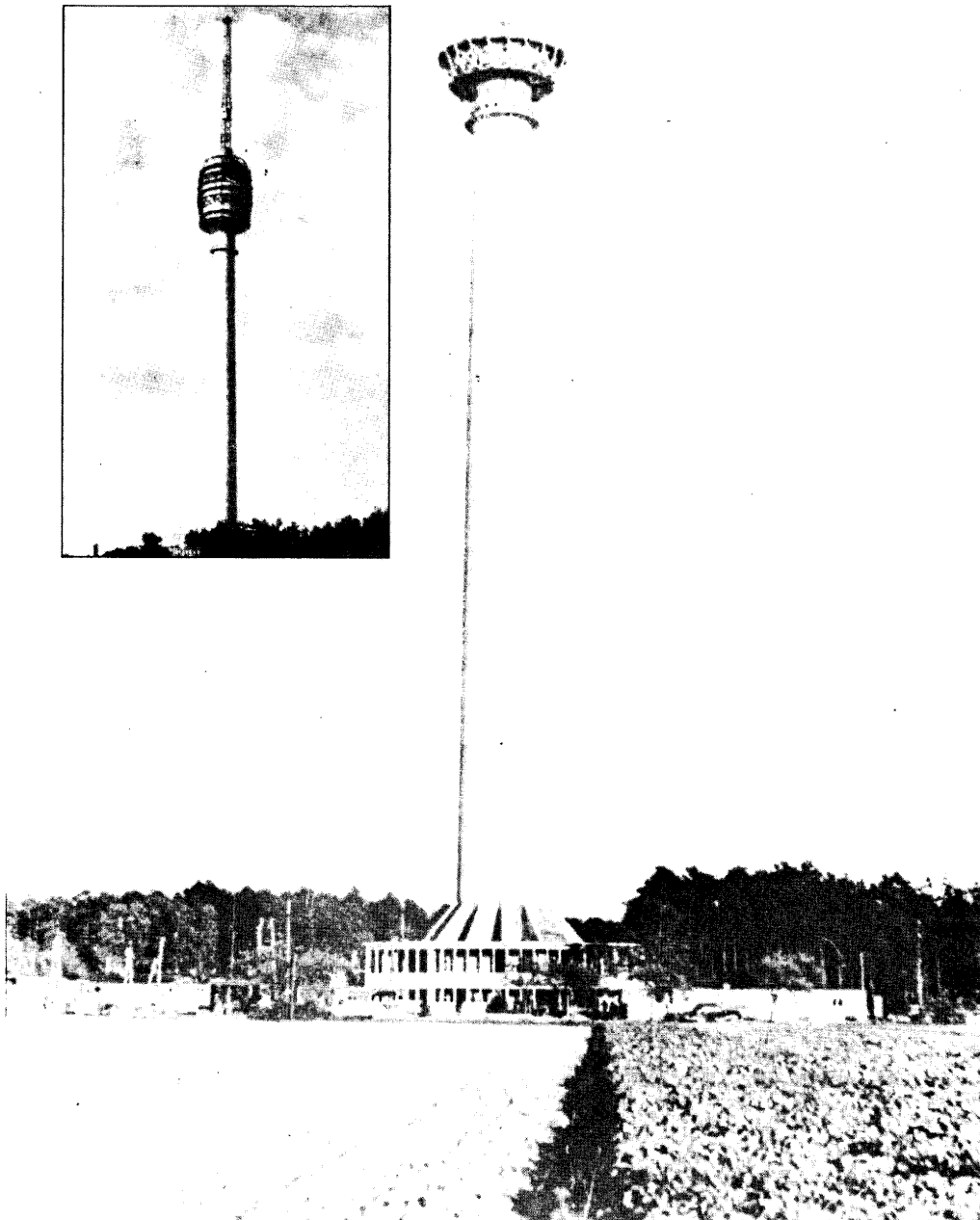


FIGURE 3
East Germany: Tapered Category I (Tall) Tower Under Construction
at Dequede, 1959

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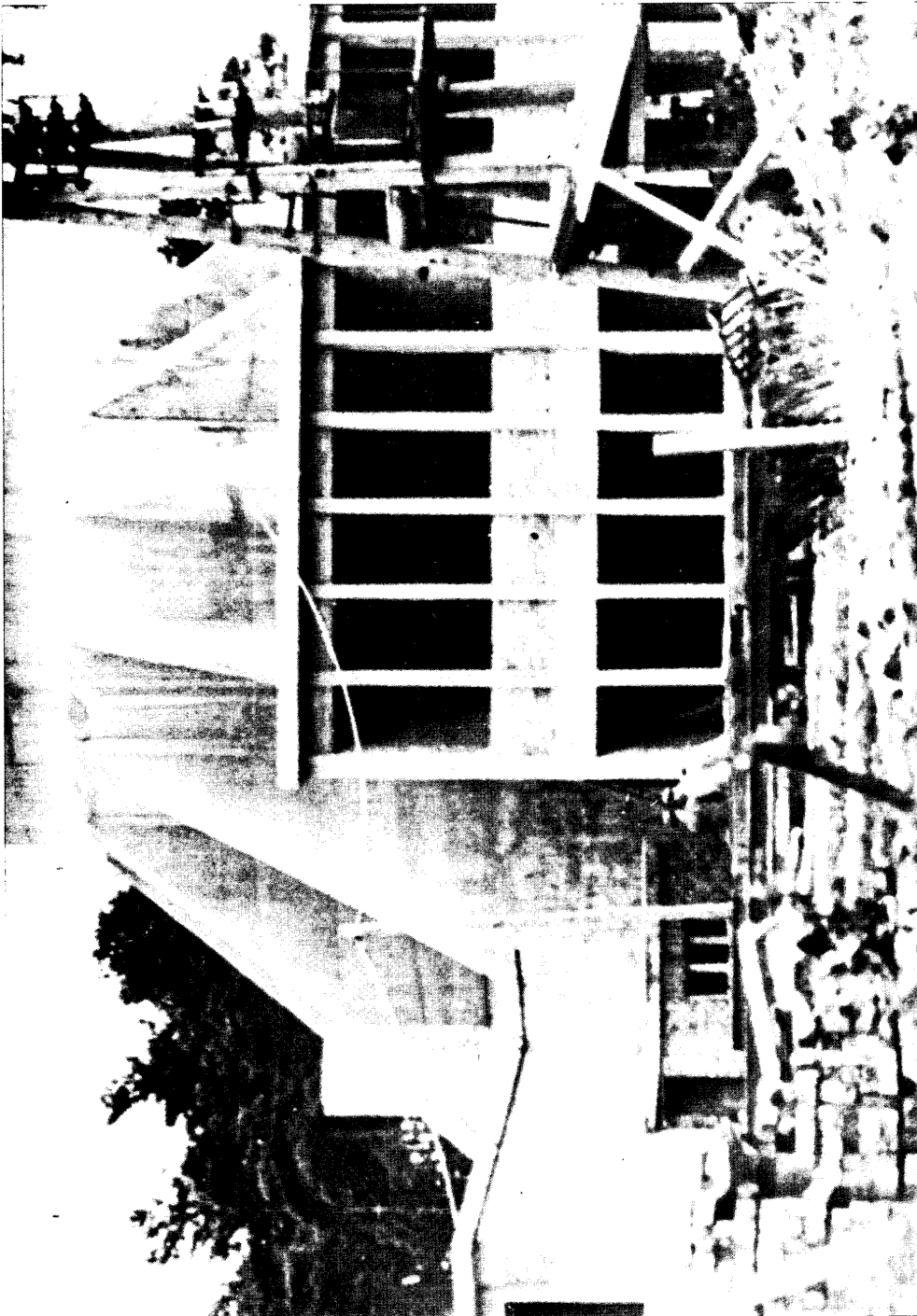
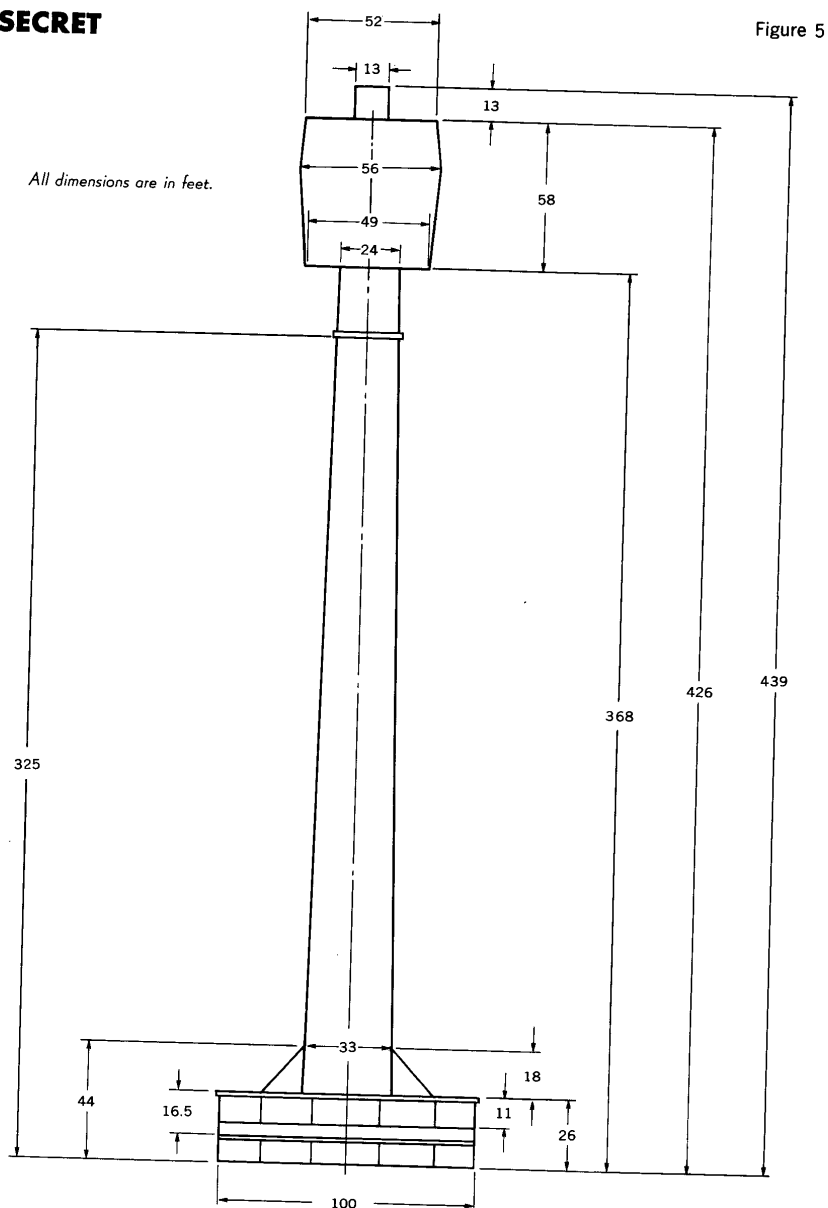


FIGURE 4
East Germany: Base Structure of the Tapered Category I (Tall) Tower
Under Construction at Dequede, 1959

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EAST GERMANY: Sketch of Tapered Category I (Tall) Tower Under Construction at Dequede, 1959

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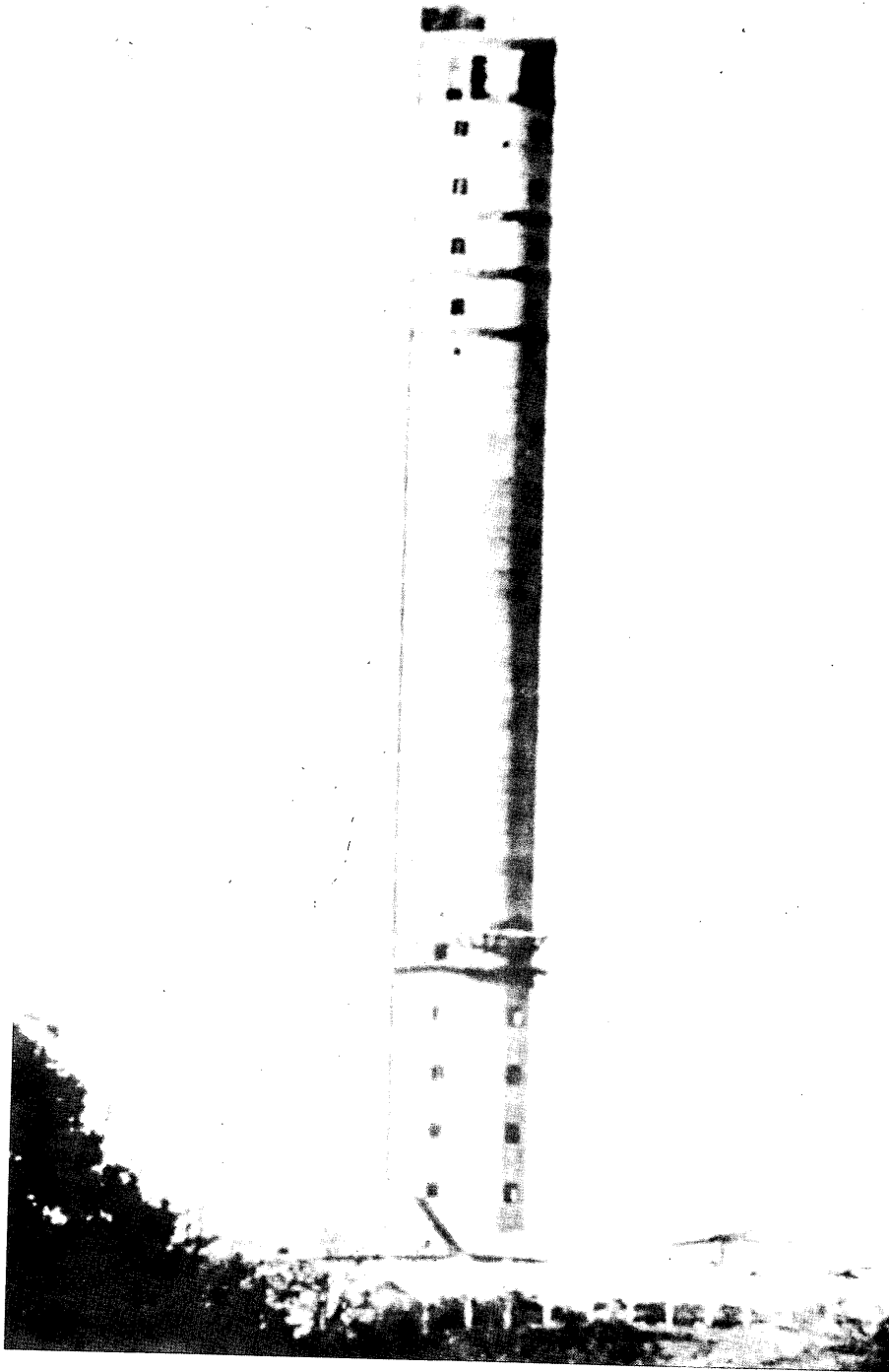


FIGURE 6
East Germany: Straight Category I (Tall) Tower Under Construction
at Rhinow, 1959

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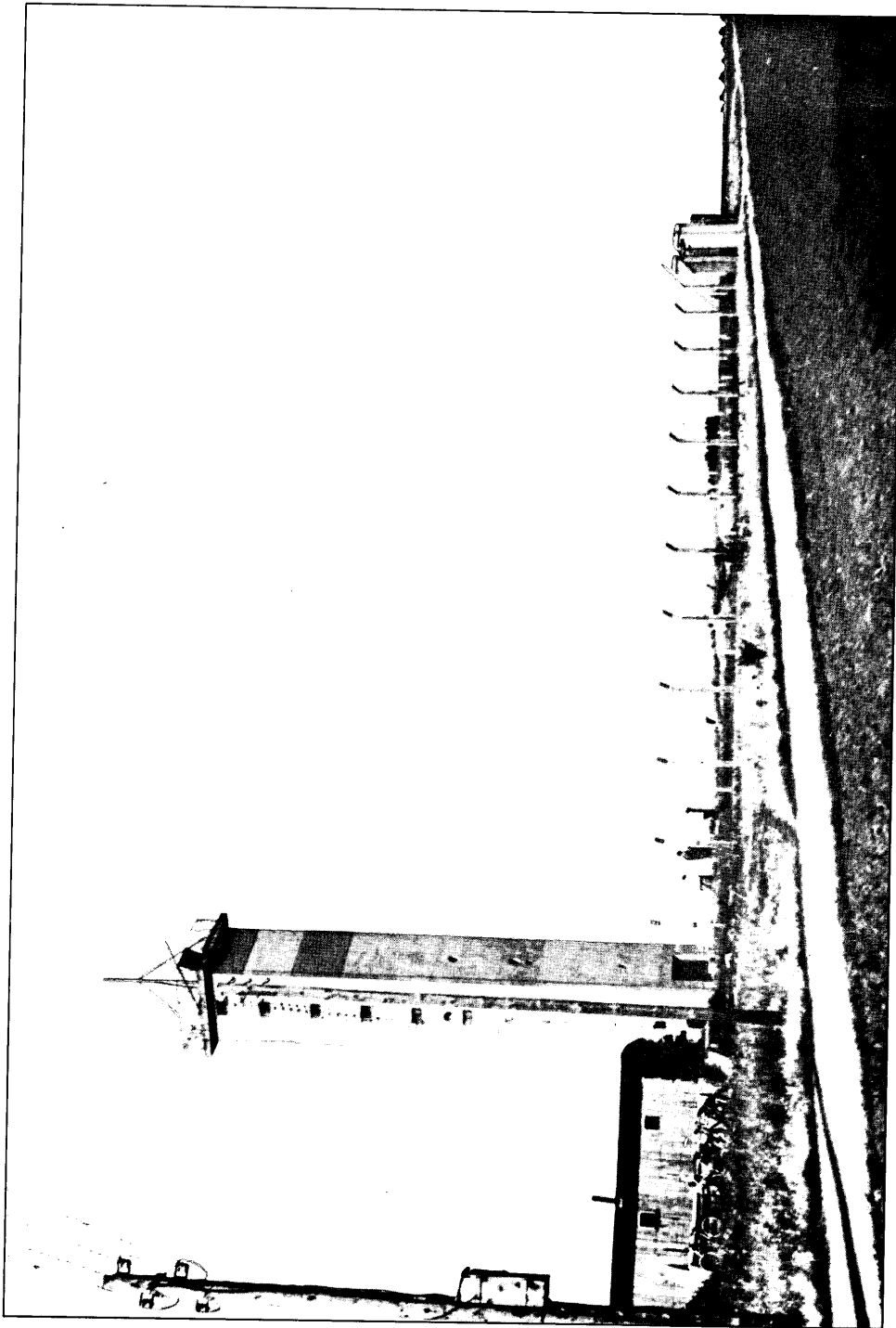


FIGURE 7

East Germany: Category II (Medium) Tower Under Construction
at Sandersleben, 1959

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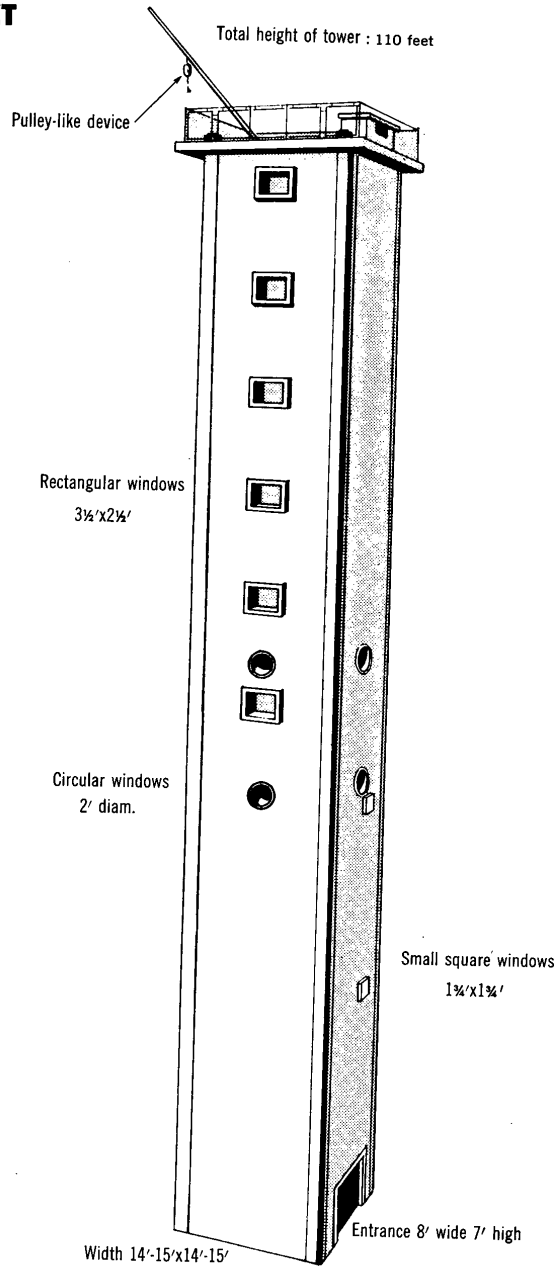


Figure 8

EAST GERMANY: Sketch of a Completed Category II (Medium) Tower

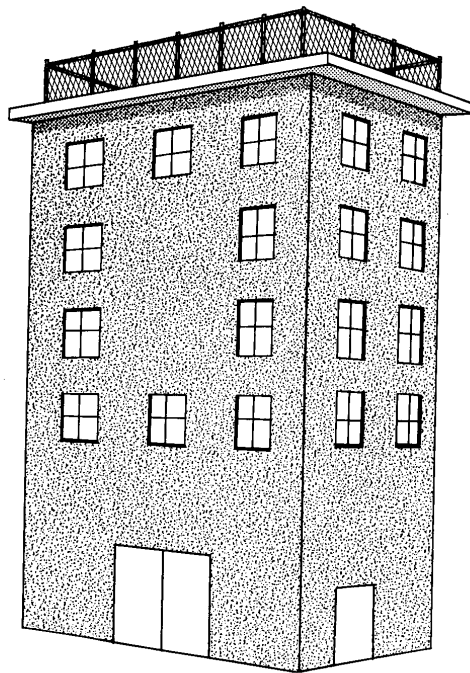
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Figure 9

Total height of tower : 80 feet



EAST GERMANY: Sketch of a Typical Category III (Short) Tower

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used to carry public telephone and telegraph traffic. Facilities of the network also serve as the primary medium for the relay of television programs within East Germany, connecting all television stations with the main studios in East Berlin. The MPT microwave network was set up in 1951, when a 28-kilometer (km) line was installed between Nauen and Berlin to be used exclusively for telephone service. In late 1952 a 13-km line connecting the television studio in Berlin/Adlershof with the television transmitter at the Stadthaus in East Berlin was put into operation. After the installation of this line, facilities of the MPT network were expanded significantly and by the end of 1958 consisted of about 1,300 km of line.

The SED network is a relatively secure multichannel microwave radio relay system used almost entirely to carry Party telephone and telegraph traffic. Originally the network was controlled by the Ministry of the Interior but was operated by the Garrisoned Peoples Police (KVP). Shortly after the network was constructed, however, operation and control passed to the SED. The transfer was intended to give exclusive use of the facility to the Party, but the KVP and possibly its successor, the East German Army (EGA), continued to use the network.

The SED microwave network was begun in 1953, in direct consequence of the uprising of 17 June 1953. During the uprising the wireline network of the Secretary for State Security of the Ministry of the Interior was almost completely disrupted, partly by sabotage, thus lessening the ability of internal security forces to contain the uprising. This incident pointed up most sharply to the Party the acute need for alternative facilities to give more flexible and reliable telecommunications service. For this purpose, the East German government decided to install a microwave radio relay network. Construction by the Sachsenwerk-Radeberg plant began in late 1953. By the end of 1956, facilities of the network consisted of about 27 terminal and relay stations with about 1,350 km of line.

Operation of the MPT and SED microwave radio relay networks has not reached full efficiency. The most important reasons are excessive distances between some terminal and relay stations, resulting in the transmission of weak signals over many important routes; use of low-capacity, obsolete equipment, resulting in a limited service capability; and use of long lead-in high-frequency cables, which cause high losses of power between the equipment and the antennas and result in the transmission of weak and distorted signals. These shortcomings reveal not only hasty and somewhat poor engineering design but also the inability of the electronics industry of the country to develop and produce better equipment.

In consequence of these shortcomings, East Germany has embarked on a two-phase program to modernize, reorganize, and expand these two networks. The first phase, underway since 1957, calls for the construction of masonry towers. Entailed in this phase is the replacement of all existing temporary steel microwave towers by concrete or brick installations and the construction of additional microwave terminal and relay stations. The second phase of the program consists of installing in all these new towers high-capacity microwave equipment employing up-to-date technology. These towers also might accommodate equipment for such services as command and control of guided missiles, radar for air defense, electronic countermeasures and jamming, and tactical communications. Although inconclusive, the available information strongly suggests that at least some of these towers will be used for these services.

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A. Category I (Tall)

The MPT in East Germany embarked in 1957 on a program for the modernization, reorganization, and expansion of its microwave radio relay and television networks. The motivation for the program apparently stemmed from the need to eliminate the shortcomings inherent in the existing networks. The major goals of the program were to establish a long-haul, high-capacity microwave radio relay network capable of meeting the increased demands for speedy and reliable telephone and telegraph service and to extend the domestic coverage and improve the technical quality of radio and television broadcasting. The program entails constructing new massive concrete towers for microwave radio relay communications and television broadcasting purposes, replacing temporary steel microwave towers with concrete or brick installations, constructing additional television radio relay stations, installing modern microwave radio relay equipment in all towers, and increasing the power of television transmitters currently in use.

Category I towers are a part of that program. As shown on the map, Figure 10,* such towers are under construction at seven sites. Four more towers are planned, construction of which should begin during 1960-61. The geographic distribution of the tall towers, built and planned, shows the pattern of the future development of the microwave radio relay network and therefore of the television network. With these structures serving as the major terminal and relay facilities, the network will extend both east and west and north and south. It will consist of three major connected rings -- the northern, the middle, and the southern. This "round robin" layout will add to the reliability of the system, in that traffic can flow over alternate routes should any part of the network become inoperable.

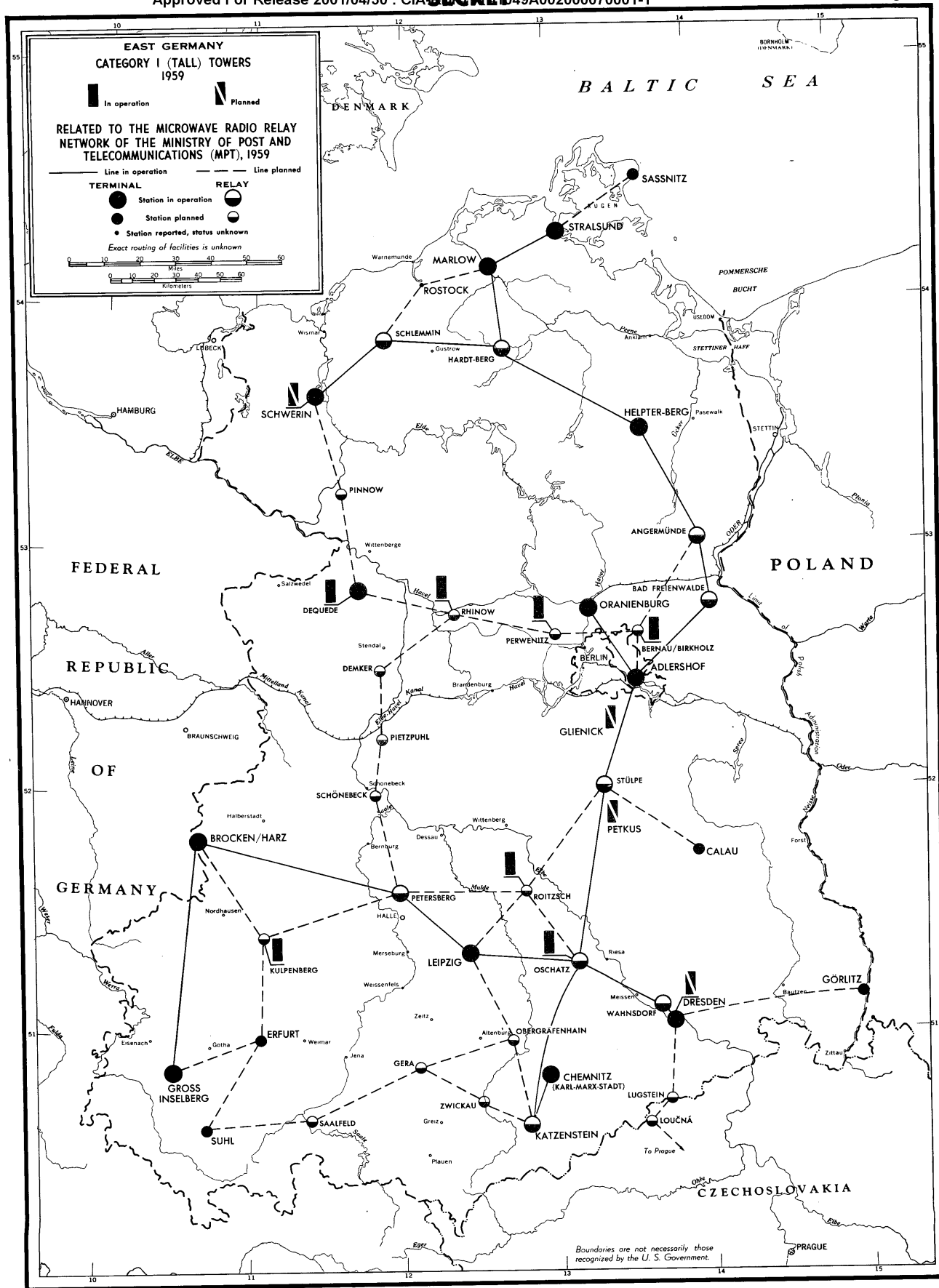
The towers at Dequede, Rhinow, Perwenitz, Bernau/Birkholz, and Roitzsch probably will be put into operation in mid-1960. Construction of these facilities is nearly completed, and the installation of equipment should begin shortly. Plans indicate that these towers will contain modern microwave radio relay and television equipment for telephone and telegraph communications and for broadcasting. In addition, the towers at Dequede and Perwenitz and probably the one at Bernau/Birkholz will contain equipment for frequency modulation (FM) broadcasting and for radio-telephone and radio-telegraph communications other than microwave radio relay.

The microwave radio relay equipment to be used will be the type RVG-958, which is being developed by the Rafena Plant in East Germany. A prototype should be available by the end of 1959 or early 1960, and full-scale production should begin in 1961. The RVG-958 operates on 4,000 megacycles and can provide either 600 telephone channels or 1 television channel. On this basis, it is assumed that at least two pieces of RVG-958 equipment would be installed in each tower to provide 600 two-way telephone channels and 2 television channels, one in each direction. The television transmitters that are to be used will have a power of 10 kilowatts (kw). Produced by Koeppenick Radio Plant, also in East Germany, this equipment should be available in early 1960. In addition, more than 2 million DME have been allocated for the import of two 10-kw television transmitters from West Germany. At present, research is being conducted in the development

* Following p. 6.

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of high-gain television antennas for use in conjunction with East German produced transmitters. Until such antennas become available, television antennas imported from the West German firm of Rhode and Schwarz will be used.

All communications equipment will be housed on floors or platforms located near the top of the towers. The microwave radio relay and television equipment will be located close to their antennas, so that the high-frequency cable for connecting the two will be shortened, thus reducing losses of power.

Careful and detailed planning appears to have gone into the design and the construction of the tall towers, but the towers at Dequede, Rhinow, Perwenitz, and Bernau/Birkholz are higher than would normally be adequate for microwave radio relay transmission. These towers are on relatively flat terrain, about 25 to 30 statute miles apart. For the distances and the terrain involved, towers of from 210 to 260 feet would appear to be adequate, but these towers are about 439 feet high, except for the tower of Rhinow, which is about 275 feet high. It is likely, therefore, that the towers were constructed at these heights to extend the radius of television broadcasts emanating from the multielement antennas erected on top of these towers.

Detailed data on investment in the construction of tall towers and their contents are lacking. One report states that capital outlays will total about 26 million DME. For the known uses of these towers, this figure is estimated to be reasonable. The willingness of the East German government to undertake a program of this magnitude does suggest that important political and military considerations were involved in the decision.

1. Political

Because of its geographic proximity to the West, East Germany is continually exposed to the political and sociological influences of the West. This exposure has led to the heightening of the ideological struggle between East and West Germany. The startling postwar recovery of West Germany, as evidenced by a prosperous West Berlin, a Western-influenced society in the midst of a Communist-controlled society, has had an unstabilizing effect on the East German population. The political unrest in East Germany, which culminated in the uprising of 17 June 1953 and which currently results in the defection of more than 1,000 people each month, can be attributed in large part to these influences.

In this ideological struggle between East and West Germany, media of mass communication such as radiobroadcasting and telecasting have become increasingly important weapons.* Since 1957 the governments of both countries have placed increasing reliance on television, perhaps the most effective of all mass media of communications, in their efforts to capture the minds of the people on the other side. As part of its campaign, West Germany in 1957 began installing new television stations along the East German border. These stations, as well as the large station in West Berlin, extended the coverage of

* The State Radio Committee, directly subordinate to the Council of Ministers, is responsible for all broadcasting programs and schedules of East Germany.

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West German telecasts into the heart of East Germany. Complaints appearing in the East German press about citizens who view West German television and then suffer from erroneous impressions "that workers are better off in the West" testified to the effectiveness of these telecasts. In 1959, West Germany announced plans to erect a new television station in West Berlin. One of the major purposes ascribed to this new facility was to bring more East German viewers within the range of West German telecasts.

In response to the buildup of West German efforts at penetration by television, East Germany countered with a penetration program of its own. This program was designed not only to expand and improve telecasts to West Germany and West Berlin but also to minimize the ability of West German telecasts to penetrate East Germany.

Steps taken to expand and improve services to West Germany and West Berlin included converting East German television from the standards of the Soviet Bloc to those of Western Europe, installing additional transmitters and increasing the power of existing transmitters along the West German border, and redirecting programming efforts toward cultural presentations rather than propaganda. In an obvious attempt to counter the propagandistic efforts of West German television, East German authorities established a new television transmission frequency and then ordered the modification of all television sets in use in the country. The modification consisted of installing special adapters on the sets that then would be able to receive only the new frequency. An additional adjustment, paid for by the set owner, was necessary in order for the set to receive the West German transmission frequency.

It is not unreasonable to assume, therefore, that political interests were associated with the East German decision to undertake the program for the construction of tall towers. Completion of this program will extend significantly the reception radius of the East German television network. In addition to providing television service to more than 80 percent of the country, telecasts emanating from these facilities will penetrate far into West Germany. It is estimated, for example, that telecasts from the new tower at Dequede will reach as far as the Ruhr. Furthermore, the over-all completion of the program coupled with the completion of the program for increasing the power of the transmitters at Inselberg, Mount Brocken, and Schwerin will enable television programs originating in the main studios in East Berlin to reach audiences in major West German cities such as Hamburg, Hannover, Kassel, and Frankfurt am Main. Because of the high quality of East German programming and the subtlety of its propaganda, these telecasts, in the absence of effective West German countermeasures, could have a telling effect on the West German audiences.

2. Military

As yet, there is little evidence that military interests of East Germany were involved in the program for the construction of tall towers. Nevertheless, from the strategic locations of the towers as well as from the multipurpose nature of the equipment they will contain, it is evident that they could be used to provide services to the military. Among the more important of these are transmission of radar signals for air defense, transmission of command and control signals for guided missiles, and transmission of signals for electronic countermeasures and jamming.

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a. Air Defense

It is likely that East Germany will use the tall towers for air defense. Since 1958 the Soviet Bloc, particularly East Germany, Czechoslovakia, and the USSR, have shown continued interest in a system that utilizes television circuits on coaxial cable and microwave radio relay lines for the rapid relay of radar information. In this system, special equipment automatically converts radar displays to television transmissions that are then relayed over television circuits to major filter and command centers.

The relationship between the East German interest in adapting television facilities for rapid transmission of radar displays and the construction of tall towers is heightened by two significant pieces of information: first, the report that the tower at Dequede will house radar equipment and, second, the report that construction of coaxial cable and microwave radio relay facilities for connecting Berlin, Frankfurt an der Oder, Warsaw, and Moscow is currently underway and is scheduled for completion by 1961. It is probable, therefore, that the towers extending between Dequede (near the West German border) and Bernau/Birkholz (just north of Berlin) will form one of the main communications arteries for reporting early-warning information to filter and command centers in the USSR. By utilizing the television channel of the RVG-958 microwave equipment, these facilities could pass radar video information to Berlin, from which point the information could be relayed to Moscow through Frankfurt an der Oder and Warsaw by means of coaxial cable or microwave radio relay lines.

b. Guided Missiles

Recent intelligence reveals the establishment of guided missile facilities in East Germany. Transportable surface-to-air (SAM) launching sites for use against aircraft have been located at Glau and Jueterbog. There is also evidence that Soviet surface-to-surface missile equipment has been transported to East Germany. Additional information also suggests that missile bases, similar to the six-pad SAM type at Glau and Jueterbog, will be set up to protect the Soviet forces in East Germany. In consequence of these developments, the need arises for strategically located, highly reliable communications facilities for commanding, controlling, and integrating the activities of these bases dispersed throughout the country. Besides disseminating commands to the missile combat units, communications are needed for coordination between adjacent missile defense zones and for coordination with higher military echelons. The need for reliable communications probably will be most acute with respect to effectively maintaining operational control of the transportable SAM sites, should the need arise for their redeployment during a fluid combat situation.

There is no conclusive evidence that these tall towers will be used in support of guided missile operations, but the geographic distribution of the towers and the multipurpose equipment that they will contain suggest that they would be suitable as communications hubs in missile defense zones. Under conditions necessitating the redeployment of the transportable SAM sites, the towers could serve as base stations with which the mobile communications van at the missile site could communicate by microwave radio.

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c. Electronic Countermeasures (ECM) and Jamming

East Germany has been developing an ECM and jamming capability. A new electronic development group, recently established at the Rahnsdorf Institute in East Berlin, has programed the development of Elint interception and ECM equipment. Projects underway include equipment for the long-range (up to 500 km) detection of radar signals and for the interception and automatic jamming of signals within the 2-centimeter to 30-centimeter wavelength.

The use of the tall towers as ECM and jamming sites is feasible, especially the Dequede tower, which is located close to the West German border. As prototypes of the equipment described above are developed, it is possible that the equipment would be operationally tested at the Dequede site. Once full-scale production begins, the equipment could be permanently installed at Dequede (among other sites) and directed toward military installations in West Germany.

B. Category II (Medium)

The microwave radio relay network of the SED in East Germany is a relatively secure system used to carry Party telephone and telegraph traffic. This network, which was installed after the uprising of 17 June 1953, connects Party headquarters in East Berlin with subordinate offices in the 14 Bezirke (districts) in East Germany. By this means, effective nationwide control and direction of Party activities is maintained. As early as 1957 the SED initiated plans to improve the facilities of this network in order to overcome operational deficiencies. Evidence suggests that these plans also included the expansion of the network to provide direct communications with subordinate offices located in the 215 Kreise (counties) of East Germany. Such communications would increase the ability of the Party to direct and control activities at the lowest level of government. Expansion and improvement were to be achieved by replacing existing lattice steel towers with concrete or brick structures, by constructing additional microwave terminal and relay stations, and by installing modern equipment in all towers.

The construction of Category II towers in East Germany is part of the planned expansion and improvement of the microwave radio relay network of the SED. These medium towers, together with a large number of smaller, Category III* towers, will become part of the major permanent facilities of a new and expanded microwave radio relay system of the SED.

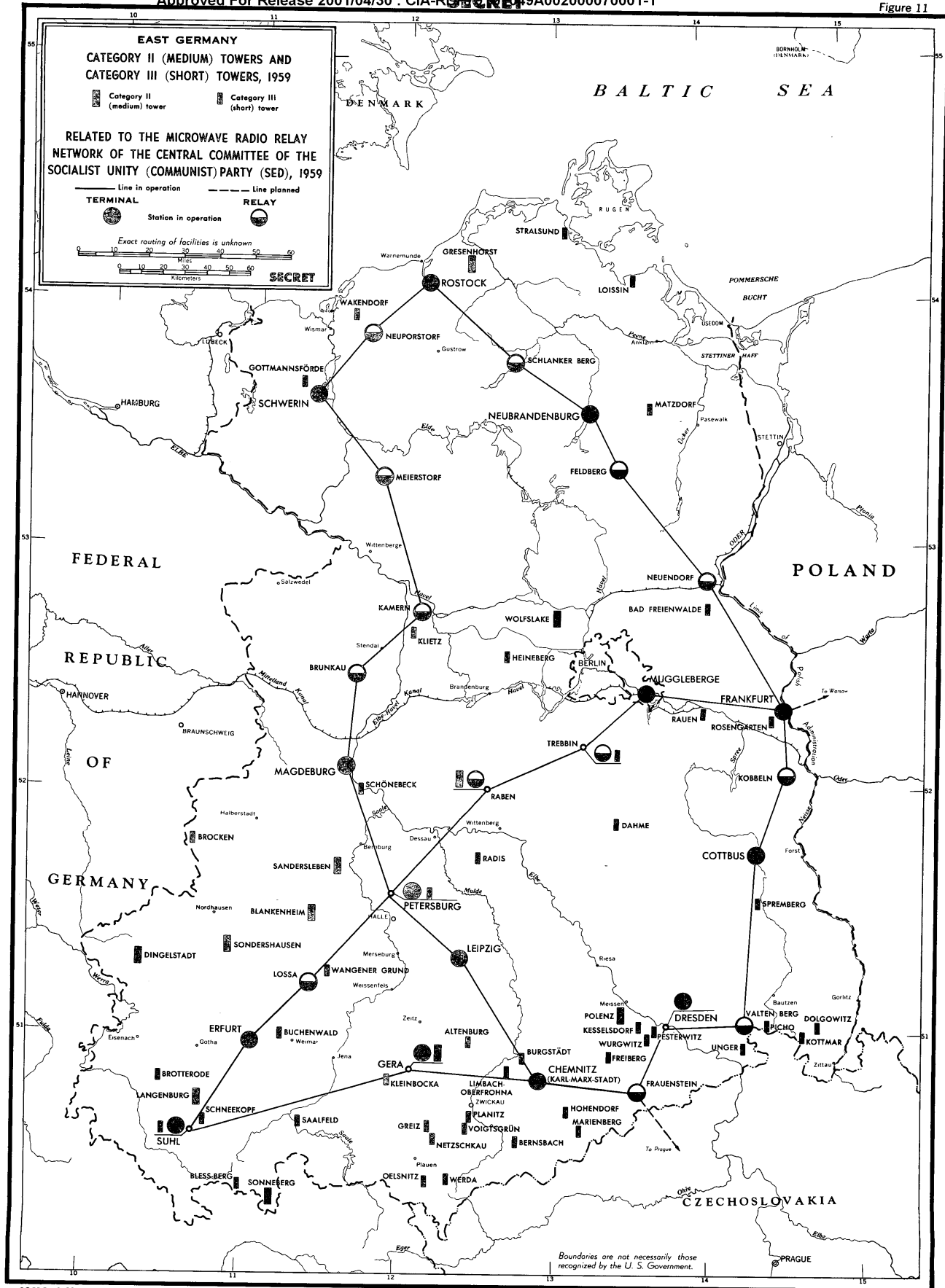
The construction of medium towers is completed or nearing completion at 11 identified sites. It is suspected that similar structures are being built at other sites, but it is not yet possible to make positive identification. As shown on the map, Figure 11,** many of the identified towers are located with or are in close geographic proximity to towers of the existing network. Where new towers do not adhere to this pattern, it is likely that the facility was located so as to shorten the path lengths between terminal and relay stations or to further the planned extension of the network.

* A discussion of Category III towers follows on p. 11.

** Following p. 10.

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It is possible that the medium towers will be unattended. This possibility is suggested by the limited space within the towers as well as by the apparent mounting of warning equipment for the detection of intruders on the fence surrounding the towers.

Medium towers will utilize type RVG-934 and type RVG-924 microwave radio relay equipment housed close to the antennas. Both types of equipment are being produced by the Rafena Plant, and delivery should begin by the end of 1959. The RVG-934 operates in the 2,450 to 2,700 megacycle range and is 24-channel equipment. The RVG-924* operates at about 2,600 megacycles and is 8-channel equipment. Because the demand for communications is the heavier at the district level, the greater capacity of the RVG-934 suggests that this equipment probably will be used for district communications and the RVG-924 for county communications.

It is unlikely that the SED will be the only user of the facilities** associated with the medium towers. In 1957 the Ministry of National Defense (MINAVE) ordered the Rafena Plant to develop the RVG-924 equipment. At that time it was specified that the equipment be engineered so that installation in vehicles would be possible. Development costs amounting to about 850,000 DME were paid for by MINAVE. Although control of the equipment subsequently was transferred to the Fundament Department of the SED, reports state that the development of the RVG-924 is considered by the Rafena Plant to be a military project. It is significant that many of the medium towers were guarded and inspected by military personnel, suggesting that some military use is intended.

Rumors have persistently identified the medium towers as radar installations. The tower at Polenz has been guarded by East German Air Force personnel. Other information states that the RVG-924 microwave equipment has been earmarked for use in a special air defense network in East Germany. It is thought, therefore, that some of the medium towers along with a large number of the smaller, Category III towers might form the backbone of an enlarged air defense network in East Germany.

It is also possible that the medium towers will be used as relay centers for tactical communications in the event of hostilities. On the assumption that field combat units of the EGA will use mobile RVG-924 equipment, these facilities could be used to reestablish and maintain communications with combat units forced to vacate fixed operating bases through changes in the tactical situation. Once communications are reestablished, the medium towers could serve as relay centers for reporting tactical information to higher military echelons and for establishing control over the redeployed units.

C, Category III (Short)

The construction of Category III towers in East Germany is related to the planned expansion and improvement of the microwave radio relay network of the SED. At the present time, construction of these short towers is completed or nearing completion at 45 identified sites. Similar structures are under construction or

* A more detailed discussion of the characteristics of the RVG-924 equipment follows on p. 12.

** In the past, facilities of the microwave radio relay network of the SED have been used almost exclusively by the Party.

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planned in other areas of the country, but identification is not yet possible. As shown on the map, Figure 11,* identified short towers are concentrated mainly in the mountainous region near the southern border of the country. They are located with or are near other towers of the SED network. When they are not close to other towers, the location may have been fixed by the need for shorter path lengths between stations or by the planned extension of the network.

Short towers will utilize RVG-924 microwave radio relay equipment. The use of this equipment, which also is used by the medium towers, is supporting evidence that, in combination, these towers will form the major fixed facilities of the expanded microwave radio relay network of the SED. Operating at about 2,600 megacycles, the RVG-924 equipment is crystal-controlled and provides 20 alternative voice channels, of which 8 may be used at any one time. The equipment has a standby protective channel with provision for switchover on failure. In addition, receiving units installed at terminal stations can interrogate as many as seven intermediate relay stations.

RVG-924 equipment is being produced exclusively by the Rafena Plant, and deliveries probably began by the end of 1959. Plans for the production of this equipment specify peak output during 1960-62 and direct a drastic curtailment of production after 1962.** During 1960-62, about 1,670 units are planned for production, of which about 1,470 are for the SED and the remainder for MINAVE. The drastic curtailment of production after 1962 implies that construction of the short towers, and therefore of the expanded SED network, is scheduled for completion by the end of that year. A further analysis of production figures leads to the conclusion that the 45 short and the 11 medium towers identified to date may be only a part of a larger construction program. On the assumption*** that each of these facilities will contain four units, a regular and a spare in each direction of transmission, production will be more than sufficient to equip a fixed tower in each of the 215 counties of the country.

Investment in RVG-924 equipment is estimated to be about 38 million DME. This figure assumes that 950 of the 1,470 units produced for SED are for use in the short towers and will cost about 40,000 DME per unit. Initially, prototype RVG-924 equipment cost about 53,000 DME per unit, but it is expected that series production may reduce unit price.

Some short towers probably are for use for other than SED purposes. The towers in the vicinity of Zittau, Gera, Sonneberg, Saalfeld, and Suhl probably are for use as relay stations to close the southern ring of the microwave radio relay and television networks of the MPT. Other towers, such as those in the vicinity of Inselberg, Mount Brocken, and Dresden, probably will serve to jam radiobroadcasts emanating from West Germany. One report declares that reception of Rundfunk im Amerikanischen Sektor (RIAS) Berlin was impaired after the short tower in the vicinity of Dresden was put into operation.

From an over-all point of view, however, the most potentially significant other use of the short towers could be for military purposes. There is reason to believe that the short towers intended for use in

* Following p. 10, above.

** During 1963-65 only 300 units are planned for production.

*** Based on US experiences in equipping microwave radio relay sites.

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the expanded SED network also will be used by MINAVE in a special air defense network. Since 1956, reports mention plans for the establishment of an early warning air defense network in East Germany. Utilizing radar equipment for detection of moving targets at a maximum range of about 200 miles, air defense information was to be passed over existing or planned microwave radio relay and multiconductor cable (including coaxial) facilities. The first evidence of possible implementation of these plans came in 1957, when MINAVE placed an order with the Rafena Plant for the development of the RVG-924 equipment. Although MINAVE did not identify the eventual use of this equipment, personnel of the Rafena Plant believed that the equipment was earmarked for use in a special air defense network. From the known interest of East Germany in the use of microwave radio relay equipment for the relay of radar video information, it is significant that, coincident with placing the order for the development of the RVG-924 equipment, MINAVE also placed an order for the development of the type RVG-925* microwave equipment and the type FS-876A transportable television transmitter. The RVG-925 was to be designed specifically for transmission of video signals and was to be used in conjunction with the FS-876A. Although control of the RVG-924 subsequently was transferred from MINAVE to the SED, reports indicate that the Rafena Plant has continued to consider the development of this equipment as well as the RVG-925 and FS-876A equipment as high-priority military projects. The fact that the short towers and the medium towers associated with the planned expansion of the SED network are the primary users of the RVG-924 equipment may explain the continued involvement of MINAVE personnel in guarding and inspecting these towers. Conceivably, the transfer of control of the RVG-924 equipment to the SED may have been for "cover" purposes to hide the multipurpose nature of the equipment and the structures in which this equipment would be housed.

The geographic distribution of the short towers may be related to air defense arrangements. The majority of the 45 identified sites are located in the strategic, highly industrialized areas of the country. These areas probably would be first-priority bomb or missile targets, but the air defense system of East Germany may be less than adequate to protect these areas, suggesting the need for a buildup in the air defense capability. On the assumption that additional short towers will be constructed to extend the SED network, it is possible that these facilities could become part of an early warning network for use in the perimeter defense of East Germany.

It is possible that the short towers employed for air defense may be part of an over-all, long-range program to develop a "hardened,"** underground, air defense system in East Germany. In this system,

* Some reports indicate that RVG-925 equipment is intended for use in the Category III towers, but confirmation is lacking.

** In the US a transcontinental line is planned which will employ a "hardened," underground multiple-tube, coaxial cable line, routed cross-country remote from probable missile targets. The line will be buried to a depth of four or more feet. It will cost more than \$300 million and will contain 12 tubes east of the Mississippi River and 8 tubes west. This decision represents a reversion to a medium which was superseded in 1950 by microwave radio relay. The importance of a "hardened" system in national defense is underscored by the fact that this line costs six times as much as a comparable microwave radio relay line.

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multiconductor cable facilities, particularly a type 17a,* would generally parallel microwave radio relay lines.

Until 1958, there was little use of coaxial cable in East Germany. Although the country had an extensive multiconductor cable network, as shown on the map, Figure 12,** coaxial cable facilities primarily consisted of the nearly completed "Ring Around Berlin." In addition to this ring, plans provided for the installation of about 3,000 km of coaxial cable, mainly around the perimeter of the country. Indication of the implementation of these plans came in late 1958 and early 1959 when a 245-km coaxial cable line was installed between East Berlin, Frankfurt an der Oder, and Cottbus. This line, called the Southern Truck Carrier Cable, consisted of a twin 17a coaxial cable. 25X1C

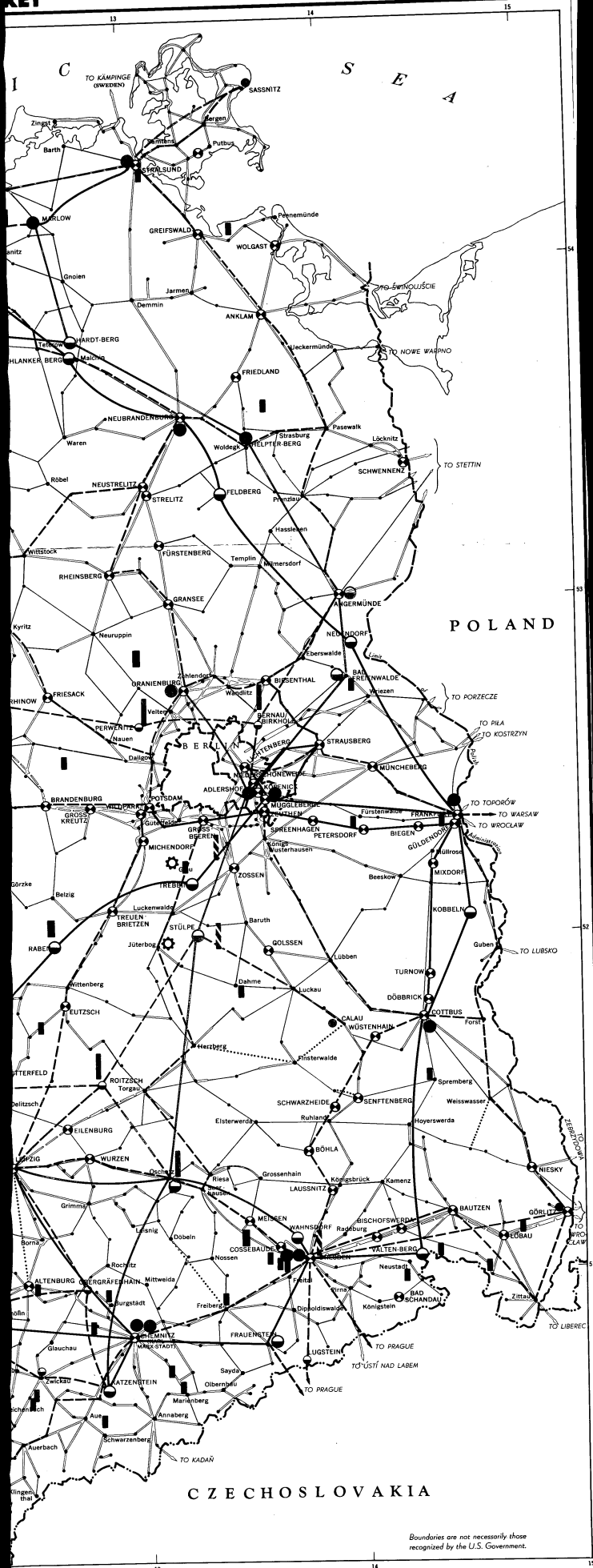
25X1C It is significant that also in 1958 [redacted] the organizational structure of the Security Department of the MPT was changed. Control of this Department was transferred from the Main Administration for Telecommunications to the Second Deputy Minister of the MPT. Six specialized groups were established within the Department, of which one, known as SFl-NWA-Dienst (Air Raid Protection Service) reportedly was responsible for the construction and installation of an East German air defense network for use by the military. Another group, SF-2, was responsible for the installation of an air defense network for civil purposes. Coincident with this report, 25X1C [redacted] East Germany planned to establish a telecommunications network to be used exclusively for early warning against air attack. Major facilities of this network were to consist of multiconductor and coaxial cable lines for telephone, telegraph, and video transmissions. The network, under control of the military, was to connect air warning headquarters located in each of the fourteen districts of the country. Inasmuch as the investment plan of the MPT for 1959 included funds for the implementation of the project, it is assumed that this project is identical with the project associated with Air Raid Protection Service. The similarity of goals as well as the involvement of the military in both projects strengthens the creditability of this assumption.

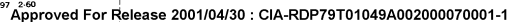
Except for the installation of the line between East Berlin, Frankfurt an der Oder, and Cottbus, little progress apparently was made in the implementation of the project. In May 1959 the entire cable-laying program of the Air Raid Protection Service was dropped from the 1959 investment plan of the MPT. This change was necessitated by the limited facilities for the production of coaxial cable in East Germany and by the heavy commitments for the export of high-capacity, multiconductor cable to other countries of the Soviet Bloc. The program is scheduled to be resumed in 1961 or 1962, at which time East Germany plans to import from the West automatic machinery for making coaxial cable.

The decision to delay a project that probably was intended to meet a high-priority military need strongly suggests that completion of other facilities to meet this need is imminent. The short towers, construction of which appears to have been accelerated, may be these other facilities. It is significant that the estimated completion

* Type 17a coaxial cable consists of 16 balanced pairs and a coaxial tube.

** Following p. 14.





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date of the program for the construction of these towers approximates the estimated resumption date of the cable-laying program of the Air Raid Protection Service. The short towers possibly will be the primary facilities for the transmission of air defense information in East Germany, and the "hardened" communications facilities, multi-conductor and coaxial cable, will be the secondary (backup) facilities. Although a system utilizing dual facilities is necessarily costly, it could be indispensable in strategic military air defense during war.

III. Intra-Bloc Relationships

Masonry towers comparable to the tall towers under construction in East Germany also are under construction in Czechoslovakia, Poland, and the USSR. These towers also will be used for microwave radio relay communications and television broadcasting purposes. The photograph, Figure 13,* shows the masonry tower under construction at Velka Javorina in Czechoslovakia.** This tower is strikingly similar to the tall tower under construction at Roitzsch in East Germany, shown in the photograph, Figure 14.*

To the extent that the construction of masonry towers in East Germany is related to that in other countries of the Soviet Bloc, this relationship probably reflects the influences of a Sino-Soviet Bloc body formed in 1957, known as the Organization for Cooperation Among the Socialist Countries in the Fields of Post and Communications (OSS). Under the domination of the USSR, the OSS mainly is concerned with standardizing, integrating, and expanding the telecommunications facilities and services of the Bloc. One of the major objectives of OSS is to establish uniform microwave radio relay facilities in member countries for use in a Bloc-wide telecommunications (including television) network. Such a network would enhance the ability of the USSR to exercise control -- economic, political, and military -- over the other countries of the Bloc. Furthermore, it would add to the military capability of the Bloc because of the possible use of microwave radio relay facilities for transmitting air defense information.

In an initial effort to attain these objectives, the OSS is believed to have developed plans for the construction of a microwave radio relay line connecting East Berlin, Warsaw, Prague, and Moscow. This line probably will be a modern, high-capacity facility capable of providing telephone, telegraph, and television services. The line will use either the East German RVG-958 or the Soviet Vesna microwave radio relay equipment. Inasmuch as the RVG-958 and the Vesna equipment are compatible, it is also possible that both types of equipment will be used.

A comparison of the locations of the masonry towers under construction or planned in East Germany and of those in other Bloc countries shows that the locations of some of the towers meet the requirements of the planned route. This is particularly true of the tall towers under construction and planned at Bernau/Birkholz and Dresden in East Germany and to the tower under construction at Petrin Hill in Czechoslovakia. It also is significant that these facilities are intended to utilize microwave radio relay equipment that is in accord with the plan. Information shows that the facilities in East Germany will use

* Following p. 16.

** A similar tower is under construction at Petrin Hill near Prague.

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the RVG-958 equipment, whereas the facility in Czechoslovakia will use either the RVG-958 or the Vesna equipment, depending on the availability of each.

It is concluded that the program for the construction of tall towers in East Germany is related to an over-all program aimed at standardizing and integrating the telecommunications networks of the countries of the Soviet Bloc. The extensiveness of this relationship is not yet known. Neither is it known whether or not the other categories of towers under construction in East Germany are related to this over-all program. Nevertheless, to the extent that this relationship exists, the program in East Germany may foreshadow future developments in the other countries of the Bloc.

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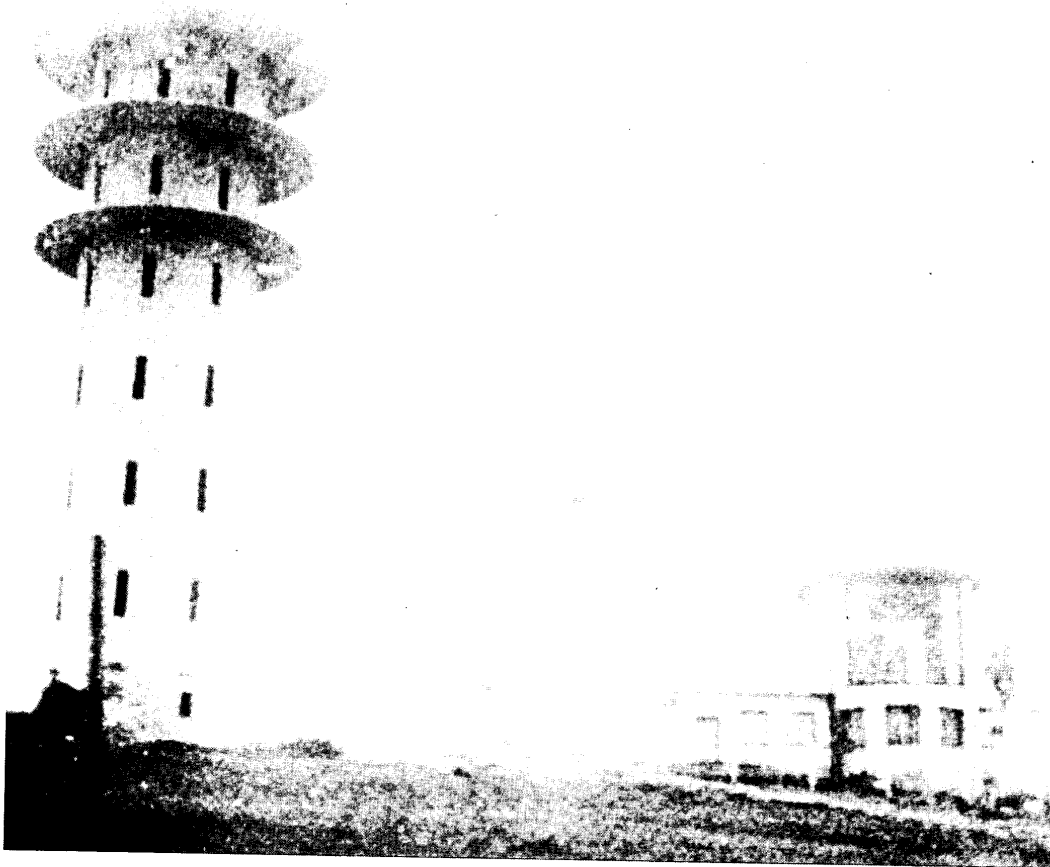


FIGURE 13
Czechoslovakia: Masonry Tower Under Construction
at Velka Javorina, 1959

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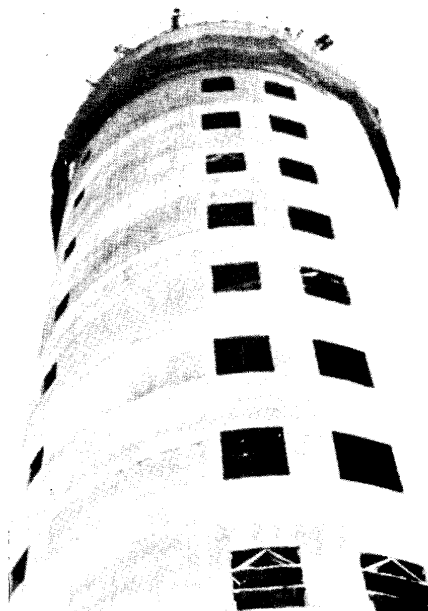
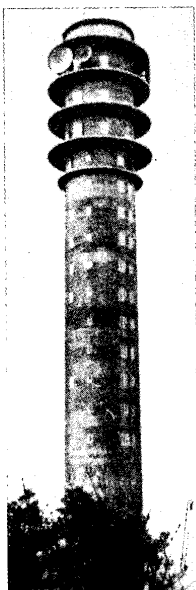


FIGURE 14

East Germany: Straight Category I (Tall) Tower Under Construction
at Roitzsch, 1959

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